THE

VETERINARY JOURNAL

APRIL, 1916.

Editorial.

SCIENCE.

THERE has been an outcry in this country recently about the necessity of a knowledge of science in political and State circles. The agitation was justifiable. Some time ago there was a loud call for a business man, one of "push and go," to put the affairs of the country straight. This was the politician's idea of the type of individual required. The demand revealed the clouded mind of those who sought their country's good. A business man may be anything from a rogue to an honest man, he may be "fish, flesh, fowl, or good red herring," a sweater of humanity to a just employer, an unjust steward with philanthropic leanings to a skinflint with moral maxims, a man of penurious habits who makes all he can to the uttermost farthing, and gives neither his employees nor country their due, to an astute operator in goods or stock whose reward is in inverse proportion to the effort expended in obtaining it. All such may be described as business men. Were any of them the type of men the country wanted? We think not. The proper need was for a good organiser and administrator with a scientific knowledge of the business he was supervising. This is not synonymous with the appellation—"a good business man." Profit and plenty of it is the chief axiom of the business man, but efficiency, corresponding productivity, avoidance of overlapping, and a good output is what the nation needed. The question of profit was a minor and subsidiary one.

In all operations, both military and civilian, in connection

with the War there is more science evident to-day than there has ever been. The progress towards the desired end has been slow, for "science moves but slowly, slowly creeping on from point to point." In industrial circles there has always been an average of it, but its lack has been chiefly noticeable in the ranks of leaders, teachers, politicians, and business men. Science here at the present time has come partly into her own because of *force majeure*, and there being no help for it. Many years ago Huxley tried to impress on the centres of learning the importance of the teaching of science. His efforts produced good at the time and for some years after, but "Let Newton be and all was light" was soon forgotten and quickly again "Nature and Nature's laws lay hid in night" as far as the universities were concerned.

In our own domain the importance of science cannot be over-estimated. A full acquaintance with all the vagaries and intricacies of animal diseases and the earnest and keen inquiry into the origin of what we wonder at are no less important and desirable than the smooth, knowledgeable, and maximum output of animal life. For many years we shall have to look for advances in science in other fields than those of mid-Europe. If we wish to do the best for our own country and Empire we shall foster, encourage and support Dame Science in our own domains. In this War the Colonies have come nobly to the support of the Motherland. There is reason to believe that in the future they will play a very important part in the march of science generally and in our own profession particularly. The steps already taken by them are apt to be overlooked. Good research work into animal diseases has already been conducted in India, Canada, South Africa, Victoria, New South Wales, and New Zealand. Some of the diseases investigated are common with us. Clinical records have come in fitfully, but there is hope that from Australia, thanks to the efforts of Majors Woodruff and Hobday, we shall in future get a fair supply.

The advance of science can only be achieved by constant effort. Inertia is less prevalent in children and youths than parents, and perhaps this is why funds have been more liberally supplied to the offspring to conduct scientific operations than to the parent stock. The science of science, however, is to bind together all scientists into one homogeneous whole.

G. M.

General Articles.

INFECTIVE VENEREAL GRANULOMA OF THE DOG.

By FRED. C. MAHON, M.R.C.V.S.

Southampton.

THIS disease is so important a one, in my opinion, that I purpose, as briefly as is possible, to condense any facts and observations I have gleaned in a large experience for many years amongst our canine patients. From notes I have culled from the works of E. Wallis Hoare, F.R.C.V.S., Hutyra and Marek's "Pathology and Therapeutics of the Diseases of the Domesticated Animals," I note that the synonyms are "infective venereal granuloma of the dog, infective sarcoma, lympho-sarcoma, vaginal warty growths, fungating excrescence." This disease of the canine species affects chiefly the mucous membrane of the vagina in the female and that of the sheath, or vaginam penis, of the male, and is characterized by warty or cauliflower excrescences or growths, which are transmissible chiefly by coition and by inoculation.

History.—The disease is mentioned by Blaine, and is stated by Hertwig, who has given a good clinical description of it, to be contagious. It did not, however, attract much notice until 1877, when Nowinsky, a Russian scientist, made known his researches on its transmission by inoculation into the vagina and under the skin.

In 1889-90 Wehr also appears to have studied the disease, and since then numerous other investigators, including Duplay and Cazin, Geissler, Bellingham-Smith and Washbourne, Powell White, Sanfelice and Bashford, Murray and Cramer devoted much time to it.

Etiology.—S. F. Beebe and James Ewing, of the Huntingdon Fund for Cancer Research and the Department of Pathology, Cornell University Medical College, found a spirochæte in the lesions of one case, but were not successful in seven other clinical cases. In 1907 Mettam found a similar organism. Probably these are normal saprophytes of the gastro-intestinal canal, and the spirochætes only accidentally invade the lesions.

The causal organism is therefore yet to be found and demonstrated. All that is known with reference to its causation is that the disease is conveyed by coition and inoculation.

In human syphilis a spirochæte—the *Spirochæte pallida*—has been demonstrated to be the cause of that malady, for which Metchnikoff endeavoured to find a trustworthy combative serum, and Ehrlich has introduced a synthetic remedy known as "606."

The toxins of the tumours have been known to set up acute interstitial nephritis when injected into dogs.

As regards its geographical distribution, it has been observed in England, France, Germany, Russia, and the United States of America extensively.

It attacks both sexes, especially the young and mature adult used for breeding purposes. It is rarely seen in those animals not bred from.

Some breeds are more susceptible to its malign influences than others. British and French miniatures of the bulldog head the list, then the pug. It is rarely found in the fox-terrier.

During the past nine months I have encountered it in a male fox-terrier and in a spaniel bitch of the Sussex type.

At p. 208 of Sewell's work (A. J. Sewell, M.R.C.V.S., "Dog's Medical Dictionary,") he adds, referring to growths on the penis, "Dogs, especially those used for the stud, and particularly bull-dogs, are liable to growths on the penis."

They are red in colour, and not unlike a raspberry in appearance. The dog suffering in this way often has drops of blood at the orifice of the prepuce. These growths are contagious, and a dog suffering from them should on no account be used for stud purposes. The growths may not only be on the point of the penis, but may be situated far back. In two cases at death's door recently which have come under observation, I found on careful *post-mortem* examination such growths affecting the penis as far back as the perineum and serious mischief to the lymphatic glands, with interstitial nephritis well pronounced (Mahon).

Professor Hobday, p. 173 "Manual of the Practice of Veterinary Medicine," briefly touches upon growths in connection with the penis of the horse, usually in connection with the glans penis, and of which, he adds, some are malignant.

Maladie du coït (pox) in the horse appears to be known very much in America. I have only once encountered it in England, and the animal was imported from Canada.

Touching on the spirochætes that have been found, we may also allude to *Bacillus coli*, which closely resembles the typhoid

bacillus in many of its characters, and is a normal inhabitant of the healthy bowel in man and other animals, and is often the only organism present in suppurative conditions connected with the intestinal and urinary tracts in man, in whom treatment by vaccination has been attended with marked success.

Take this spirochæte again. How do we know but that it, too, undergoing varying conditions, may not take on grave changes and prove of great importance in "infective granuloma" of the dog? To my mind we are still very much in the dark as to many of the micro-organisms we find present in many diseases.

Reverting again to "infective granuloma" of the dog, the causal organism has yet to be found and demonstrated. All that is known with reference to its causation is that the disease is conveyed by coition and inoculation. So far this materially helps us. For we should primarily not breed, or cause to be bred from, any male or female animal whom we suspect or find, even in the very earliest stages of the disease. Treatment is generally lengthy. We should not attempt to breed from such animals, if we act aright to our clients and do justice to ourselves, as the disease is to my mind a very serious one indeed.

As a comparison, take the human subject and note how vaccines play an important part or *rôle* in a serious disease. Take, for example, the uses to which "gonococcus vaccine" has been put.

Now this vaccine is prepared from cultures of gonococcus (Neisler) obtained from cases of acute urethritis. It is issued for use in the treatment of genito-urinary infections caused by this microbe and the conditions associated therewith, gonorrhœal rheumatism, iritis, &c.

Acute Gonorrhœa.

Favourable results have been obtained in a good number of cases, and are to be expected when the patient will submit to a *regimen* of rest during the stage of acute inflammation. Unfortunately, this is where veterinarians are so seriously handicapped in dealing with patients, for this is almost a task impossible in our sphere of influence.

If these conditions are not fulfilled, even so far as the human subject is concerned, excessive auto-inoculations are likely to occur, and will militate against a satisfactory response to the inoculations of vaccine.

Chronic Urethritis.

It frequently happens an acute urethritis in its later stages gives rise to a secondary infection of the urethral mucous membrane, *e.g.*, by diphtheroid microbes or staphylococcus, and that in the discharge which persists under these conditions few, if any, gonococci are to be found. In such cases little benefit is to be experienced from the employment of "gonococcus vaccine," and treatment should be directed to the elimination of the secondary infection.

Again, in affections of the eye "gonococcus vaccine" may be successfully employed sometimes.

If vaccines prepared under the above conditions are applicable to the human subject, I think the idea an open one so far as the patients of the veterinarian are concerned, for a vaccine to be obtained whereby the same measures that apply to the human subject can be used experimentally at least on the dog, horse, &c. From an ameliorative point of view alone they should be tried.

Whilst penning these lines *The Veterinary News*, February 12, 1916, has come under observation, and I reproduce seriatim the notes headed "A Medical Authority on Veterinary Science."

"The steady growth and development of veterinary science is to be welcomed, not only for itself as a matter of utility or as an abstract science, but also for its possibilities with reference to the human subject," says the *Medical Press and Circular*.

"In this department pathology is perhaps that branch which at the present moment appears to open up the widest vista, the comparison of lesions found in the human type with those occurring in the lower animals being of the greatest interest and value.

"In matters bacteriological and veterinary, at present we stand but upon the threshold, but it is not unreasonable to conceive that the study of infection in man and in the animal by proceeding side by side might throw much light one upon another, and come to be a source of mutual strength and progress.

"Much, if not all, of human physiology has been based upon the accurate study of animal function; if the same laws apply in health as found by experimental investigation, why not in disease, if we but study the phenomena closely? And in the matter of therapeutics much experimental work might be done upon animals

with a justification which similar procedures in the case of man would lack.

"Veterinary medicine is replete with possibilities, and, in addition, at the moment the profession is not overcrowded so far as we are aware."

This bears out my ambition, since I became a veterinarian, to study closely the diseases of man and the lower animals so-called, to look for resemblance in disease, and try and find as far as is possible the inter-communicability of one disease in man to animal, or animal to man. I believe we are, with all research, observation, &c., still only on the margin of an unknown world of science, which the years to come will, if the reins are seized confidently and courageously, teach us, both medical and veterinary practitioners, that there is a good deal in common in the ills that all flesh is heir to. At some future date I hope to produce a few facts gleaned from observations not only on syphilis of the dog, but also some researches so far as man is concerned from a comparative point of view.

As far as observation and research goes in human medicine, "gonococcus vaccine" appears to play an important part. This vaccine is prepared from a culture of gonococcus (Neisler) obtained from cases of acute urethritis. Favourable results have been obtained.

A minimal effective dose of gonococcus vaccine (500,000 to 2,000,000) is an appropriate dose during the acute stage of the disease, and should not be exceeded lest a negative phase of immunity should be induced and opportunity be afforded for the spread of the infection to joints, epididymis, &c. Such minimal doses should be repeated at intervals of two to three days, and may be cautiously increased if necessary to 3,000,000 or 5,000,000 after the acute symptoms have quite subsided.

Vulvo-vaginitis in children has been successfully treated by gonococcus vaccine.

Hamilton (*Journ. of Amer. Med. Assoc.*, 1910), in an analysis of 344 cases, found that the average duration of treatment in eighty-four inoculated cases was 17 months, as compared with 10·1 months for 260 children treated by irrigation. 90 per cent. of the inoculated were considered cured, the absence of gonococci in several successive examinations being taken as the criterion of the cure. Six inoculations sufficed for the cure of most acute cases.

Butler and Long (*Journ. of Amer. Med. Assoc.*, 1908, pp. 744 and 1301) also attempted a comparison of smaller groups of "vaccine and irrigation" cases, and obtained results favourable to vaccine therapy.

If such be accomplished with the human disease, I believe veterinarians could prepare a vaccine from cases in the dog and horse with like beneficial results.

Dosage (*human*).—Minimum effective dose, 500,000 to 2,000,000; medium doses, 5,000,000 to 25,000,000. The vaccine is issued in dilutions containing 5,000,000 and 50,000,000 gonococci per c.c.

Since writing my article, Mr. William Scott, F.R.C.V.S., Bridgwater, *re* extract from *Veterinary News*, November 1, 1913, touches broadly on the *Bacillus coli communis*, and says the kidneys may be, and often are, the seat of active *B. coli* invasions. In the female, particularly after parturition, it is probable that the infection is urogenic in origin, and this point is rather substantiated by the fact that in practice one seldom sees specific bacterial invasions of the kidneys in the males unless they are of hæmatogenic origin.

Immunization.—The animal body possesses a considerable degree of natural immunity to *B. coli*, and this may be due to the fact of their continual presence in the intestinal canal, where absorption of a certain quantity from the intestinal mucosæ of their toxins must take place, and, reaching the blood-stream, stimulates the production of antibodies, agglutinins, opsonins, precipitins.

Artificial immunity may be acquired by infecting vaccines derived from devitalized bacteria, preferably autogenous vaccines, failing which polyvalent stock vaccines, combined with a polyvalent coli, should be used.

Since I asked whether it is not possible to procure a vaccine for the organism which plays an important *rôle* in infective granuloma of the dog, &c., I have learnt that Parke, Davis and Co. prepare a "colon vaccine" in the form of hypodermic tablets, each containing 100,000,000 and 500,000,000 killed bacteria respectively. When occasion arises I hope to use these extensively, as I am convinced all other treatment is merely palliative, not curative. Moreover, I pin my faith largely to "vaccine treatment" as when used by me, especially the preventive vaccines, my success has been marked.

Mr. W. Scott's, F.R.C.V.S., article, reprinted in *Veterinary Notes*, January, 1916, issued by Parke, Davis and Co., is a welcome addition to our knowledge, and I personally tender him my sincere thanks for his ever-progressive investigations and records on what hitherto has lain dormant or unknown to veterinarians.

GAS POISONING.*

By Professor L. HILL, M.B., F.R.S.

Symptoms and Lesions of the Lungs in Experimental Animals.

Animals exposed to chlorine exhibit first of all profuse watering of the eyes and salivation; they make efforts to escape, and if the chlorine in the chamber is not mixed by a fan but sinks to the lower parts, they hold up their heads as high as possible to escape breathing the more concentrated lower stratum. The respiration soon becomes quickened, and then, as the œdema of the lungs and exudation into the air-tubes increases, the respiration becomes slower and laboured. The obstruction to the entry of air becomes great, and in consequence the lower ribs are drawn in with each inspiratory gasp. The mouth gapes open, and a frothy secretion hangs round the orifices of nose and mouth. The whole effort of the animal is given up to breathing; finally it falls over exhausted, the breathing becomes rarer and shallower, and it dies. If in the stage of laboured breathing the animal be removed from the poison, it generally dies during the next twenty-four hours, but may live longer, to die within the next few days. One of our animals died as late as a fortnight after the exposure.

Examination of the lungs of those which die in the first twenty-four hours shows an intense congestion of the lungs; they are dark red in colour, a more or less solid œdema prevents their collapse on opening the thorax. The air-tubes contain frothy exudation, which, on cutting the lungs, exudes in large quantities. When the lung of a rat was kept in a covered dish it shrank like a blood-clot, exuding serous fluid till it floated in it.

The animals which die in the later days show more or less

* Paper read before Medical Society of London, November 29, 1915.

extensive patches of red hepatization. Those parts of the lungs which were least poisoned appear relatively normal, but are more rosy in colour. Microscopic examination was carried out on the animals poisoned by us by Professor William Bulloch. The sections show intense congestion and small hæmorrhages in places, and an œdema which fills the hardened alveoli with an eosin-stained homogeneous coagulum, reminding one of the appearance of the thyroid alveoli filled with colloidal secretion. The coats of the arteries are enormously distended with exudate, giving a most remarkable picture. The epithelium of the air-tubes is in many places detached. The animals die in the early stages from asphyxia, and in the later stages from pneumonia, with consequent absorption of toxins and exhaustion.

In those animals which are less severely poisoned the laboured breathing gradually passes away; those that recover appear quite normal at the end of a fortnight. Their fur, which was made sticky and looked, so to speak, burnt at the ends, becomes glossy again, the damaged hairs being shed. These animals, if killed during the process of recovery, generally show small pneumonic patches. The lungs seem very sensitive to further injury during the period of recovery; inhalation of chloroform may cause in them an acute œdema, and drown the animal.

There seems no reason why recovery of the lungs should be any less perfect after chlorine poisoning than it is after broncho-pneumonia. The damaged and shed epithelium of the air-tubes can be replaced, and the pneumonic patches resolved by the absorptive action of the phagocytes, until repair is complete.

I have no evidence to offer as to the state of the lungs at any long period after the poisoning.

The remarkable fact that some parts of the lungs are far more severely damaged than others requires an explanation. When chlorine of, say, 1 in 1,000 is driven into the lungs by artificial respiration, and the lungs are exposed and observed from the start, it is evident that the poison reaches and severely damages certain parts on the surface while other points remain normal. In these experiments the current of air from the pump was driven through chlorine water and then passed into the windpipe. We must suppose either that the chlorine does not uniformly mix with the air, or that certain air-tubes are shut up by contraction of the bronchial muscles and so prevent the poison reaching the alveoli they supply.

There is no doubt that the first effect of a concentration such as 1 in 1,000 is to cause contraction of the bronchial muscles and diminish the expansion of the lungs. Using enormously strong concentrations, Sir Edward Schäfer finds no evidence of such contraction—probably the concentrations he used rapidly killed the lining membrane of the air-tubes, including the muscle. Some experiments conducted by F. J. Twort and myself on the oxygenation of the blood, in subjects breathing in a shallow way, suggested to us that parts of the lungs may then not be expanded nor the blood oxygenated in these parts, and that the bronchial muscles may regulate to which part of the lungs the air goes on each inspiration. The results of our chlorine experiments seem to confirm this view.

Treatment.—For the severe cases of chlorine poisoning the object of treatment must be that of getting rid of the exudation in the air-tubes which is drowning the victims. Experiments on animals show that the frothy fluid can be easily squeezed out of the lungs and trachea by rhythmic compression of the thorax, and that the dyspnœa which is threatening life can be greatly, if only temporarily, eased by this means. Artificial respiration is reported to have given good results on several of the cases on which it was tried. The artificial respiration requires to be repeated as often as the dyspnœa becomes excessive. The case is recorded of one man, almost moribund, who was treated in this way on four successive occasions, and who ultimately recovered. After squeezing out the fluid, air may be blown into the lungs by mouth-to-mouth artificial respiration, to overcome the resistance of the froth in the smaller tubes and expand enough lung to keep the patient alive. It is true that emphysema may be caused by so doing, but if it is a question of just carrying a man through the threatened asphyxia, one cannot hesitate to get air into the lungs by these means.

I took over to Flanders an apparatus constructed by Messrs. Siebe, Gorman, called the Vivator, in which there is a foot-pump which feeds a face mask through a flexible tube. By each downstroke a measured volume of air, or oxygen, is pumped into the lungs, by each upstroke a valve is opened which allows the air to escape from the lungs by the elastic recoil of the thorax and lungs. With this apparatus respiration can be kept going in the collapsed or unconscious cases, the fluid now and again being evacuated by squeezing the thorax and by posture.

The inverted posture will help to drain out the fluid. I was told that several of the patients of themselves hung their heads

down over the side of the stretcher, or table, in order to aid their expectoration.

Emetics have proved very useful in giving relief to the less critical cases. Half a pint of salt and water, or 8 gr. of copper sulphate, followed by large draughts of lukewarm water, are recommended. A brush, or the patient's finger, put to the back of the throat will initiate the vomiting without delay. The act of vomiting is reported to cause the expulsion of a large quantity of the frothy fluid.

Administration of oxygen relieves the cyanosis and improves the condition of the subjects.

Not only does the percentage of carbonic acid in the blood rise in the suffocative condition, but other acids, such as lactic acid, increase in quantity owing to the lack of oxygen. When the blood is oxygenated by breathing of oxygen, these other acids do not appear, and the acid intoxication is therefore so far eliminated. Tests of the power to hold the breath show that a higher percentage of carbon dioxide can be borne when oxygen rather than air fills the lungs. To give oxygen to a man who is struggling for breath and needing to expectorate is no easy matter. It is difficult to get tolerated any kind of close-fitting face mask. The ordinary clinical method of administering oxygen through an open funnel held near the mouth and nose is of relatively small value; nearly all the oxygen is wasted by escaping into the atmosphere; just at the period of inspiration the stream is not enough which reaches the mouth and nose, so that the air drawn into the lungs is but very slightly enriched. I have found the oxygen in my alveolar air increased by only 1 or 2 per cent. when oxygen was administered to me by a sister in a London hospital. If a loose kind of face mask be made out of a towel, and the oxygen tube be led under that, and the oxygen sent in sufficient stream to blow away the exhaled carbon dioxide, then 70 per cent. of oxygen can easily be obtained in the alveolar air. Down Bros. have made a transparent face mask on my design fitted with a curtain which drapes the face, by which oxygen can be effectively given on this plan—but not economically. A 20 ft. cylinder is soon blown away by these methods. To give oxygen economically, a well-fitting face mask, breathing bag and cartridge for absorbing the exhaled carbon dioxide must be used. The subject breathes through the cartridge in and out of the breathing bag, which is filled with oxygen from the cylinder as required. The cartridge is loosely packed with small pieces of caustic soda-coke; to prepare these the coke pieces are heated red hot and dipped into strong caustic soda. They offer a splendid absorbing surface and no appreciable resistance to the breathing.

This apparatus is made by Messrs. Siebe, Gorman. I took over some for use in Flanders. The difficulty in using such lies in keeping the mask over the face of a man who wants to struggle and expectorate. Oxygen breathed between the periods of expectoration will undoubtedly give him relief, and with the above apparatus a 20 ft. cylinder will give a supply lasting many hours.

Experiments on animals have showed us that compressed air relieved the dyspnœa to the same extent as oxygen does. On placing a patient in a medical air-lock, such as is used in compressed air tunnel works, and compressing him to two atmospheres, he would breathe double the concentration of oxygen. and at the same time would be able to expectorate and struggle as he pleased. The compression of the air when first applied would halve the size of the air bubbles in the frothy liquid which obstructs the air-tubes, and this should give relief by lessening obstruction. Artificial respiration could be applied in the compressed air chamber, and the subject be kept in it for several hours, and then slowly decompressed. The medical locks are fitted with air-locks, through which the medical officer can enter or leave. The difficulty, of course, lies in the provision of such medical locks, heavy cylindrical boiler-like structures, each of which would hold only four or five patients, with the necessary oil-driven compressor engine. A small medical lock and engine would go on a three-ton lorry, but it is a serious thing to hamper the transport of the Army with such a provision. There is another way in which oxygen might be administered without the use of a mask, and that is by drawing over the stretcher containing the patient a cylindrical balloon, say 10 ft. by 4 ft., tying up the end, and then distending the balloon with oxygen.

The giving of atropine has been extolled on the theory that it lessens secretion of fluid and dilates the bronchial tubes. In severe cases of poisoning we have not found it of the least service.

It is claimed that the inhalation of stramonium vapour from cigarettes relaxes the bronchial muscles; this may afford relief in the mild cases, which recover whether so treated or not.

The chlorine poisoning of the lungs is comparable with extensive burns of the skin, and the same general treatment to support strength and lessen the shock is required. Just as septic infection of the skin is the sequel of the burn, so pneumonia and bronchitis follow chlorine poisoning. In our experimental animals severe poisoning has in every case had this end, and we know of no means of prevening it. Warmth and good nursing might pull a man through; these conditions are difficult to apply to animals.—*From Journal of Royal Army Medical Corps.*

THE GOAT AS A SOURCE OF MILK.

Owing to the usual arrangements in dairying by which milk is sold under contract to distributing agencies in towns, or made locally into butter or cheese, it sometimes happens that cottagers and others living outside the area of retail delivery find it difficult to obtain milk for their families. In these districts goat-keeping might be extended with great advantage. All the objections which apply to the keeping of a cow by a cottager would be met in the case of a goat. The first expenditure for its purchase is within his means; the housing accommodation is reduced to a minimum; the food costs very little; and there is no great expense to be borne for the maintenance of the animal. Even where cow's milk is readily obtainable, however, goats may be profitably kept to supply milk for domestic use.

Unfortunately there has been for many years a widespread belief that goats' milk possesses a peculiar flavour. Not only is there no justification for this belief, but, on the contrary, the rich creamy taste of the milk renders it more attractive to the palate than cow's milk. Goat's milk, moreover, possesses two special qualities which alone should make it popular, viz., (*a*) it is easily digested by children, and especially infants, and (*b*) it is far less likely than cow's milk to contain tubercle bacilli of animal origin.

How to start Goat-keeping.

One of the greatest difficulties which beset the prospective goat-keeper is to obtain suitable stock. The best specimens of goats are frequently exported, and as no fresh stock can be imported from abroad to replace them, it is necessary to depend entirely on home-bred animals. There is, however, still a fair number of common goats available, and beginners will find it best to commence with one of these, costing up to £2 or £3, and to improve their stock gradually.

Characteristics of Milk Production.

In selecting a goat, it is well to remember that there are certain features which may be regarded as characteristics of milk production. The body should be long and fairly deep, although if the latter point is very marked, it is probable that

the animal is aged. It is important that the ribs should be well sprung, whilst a long head and a slender neck are generally considered to indicate a good milking strain. If the goat is dry the quality of the udder cannot be ascertained, but if in milk the udder should be carefully examined. It should not only be of good size, but soft and pliable, and the teats should be long and pointed, as they are then most easily handled. It is always desirable for the purchaser to see the goat he is about to buy milked at least once before coming to a decision. This is necessary not merely to ascertain the actual yield, but to find out if the animal stands quietly while being milked. A goat purchased in milk should not be less than two years old or over five. The age can be detected by examining the teeth, for particulars of which the reader should refer to the various books on the subject.

The Breeds of Goats.

In this country there are at most five breeds of goats, two of which belong to what may be called the common kind, and three to the improved varieties. The "common" type are the English and the Irish goats, the former being short-haired, with horns rather short and branching outwards, and the latter long-haired with more upright horns. Both are prick-eared and, with slight differences, resemble the common goat in other parts of Europe. The superior breeds in their order of value as milkers are the Toggenburg of Swiss origin, the only strictly pure breed in Britain, and the Anglo-Nubian, now regarded as a separate breed, but produced many years ago by crossing the English goat with stock imported from the East.

In addition to these breeds there are what are known as "Swiss" and "Anglo-Swiss," the former being a cross between the Toggenburg and other Swiss breeds, and the latter a cross again of these with the common goat or the Anglo-Nubian. Probably this last cross represents the best all-round goat in Britain, as it combines the heavy yield of the Swiss, be it Toggenburg or Saanen, with the superior quality as regards butter-fat of the Anglo-Nubian.

To the average goat-keeper who requires a good milker and cannot afford to pay a high price, the matter of breed need not be greatly considered. Nearly all the best milkers of the present

day are cross-bred animals, the result of careful selection from known milking strains.

Breeding.

The pairing season for goats is from September to January, but the earlier the service can be arranged the better, as it is desirable that the kids should arrive in February or March, so that they may have all the spring and summer before them. The period of gestation is about twenty-one weeks, or roughly, five months. She-goats that have not been served previously will come into season during January and, less frequently, in February, but, after the latter month, only very exceptionally until the following September. People who keep three goats—and this number is necessary to provide an average family with milk during the greater part of the year—should endeavour to arrange for the service of one in September or early in October, the second in November or December, and the third, if possible, in February.

Signs of the coming into season are in some cases very transient, especially in the late spring and summer. They consist in frequent bleating, a constant shaking of the tail, a turgid condition of the vulva, loss of appetite, and restlessness, and, if the goat is in milk, a temporary diminution in the milk yield. This condition will last from one to three days.

If the goat-keeper is endeavouring to improve his stock for milk production, it is essential that he should secure the services of a male bred from a good milker, or, still better, one having "milking blood" on both sides of his parentage. An alternative method would be to replace the kid or kids of the common goat by a well-bred kid of good pedigree; this may be easily done if the kid is under a fortnight old. Good pedigree kids may often be obtained comparatively cheaply by previous arrangement with the owners of well-known strains.* If neither of these courses can be adopted, it is better to kill the kids at birth and to use all the milk from the goat for domestic purposes. It seldom pays to rear male kids, and it is usually less expensive to pay even a guinea fee for the services of a good male than to rear and keep

* Before purchasing, intending goat-keepers will do well to communicate with the Secretary, British Goat Society, Coombe Bury House, Kingston Hill, Surrey, or with the Secretary, National Utility Goat Club, 31, Essex Street, Strand, London, W.C.

a stud goat; moreover, the odour and objectionable habits of the males render them anything but desirable pets.

A she-goat that has given birth to kids generally recuperates without much difficulty. If it is decided to rear the young ones they may be left with the dam for six or eight weeks and then weaned, but if the value of the milk consumed during this period is reckoned, the kids will be found in most cases to have cost more than they are worth.

Housing.

During the autumn and winter months goats are best kept on the "Soiling System"; that is, the animals are housed and all their food is brought to them. Where many goats are kept it is advisable to erect a special goat-house, or to adapt some existing building for the purpose. A simple form of house is a loose box or outhouse, bedded down with peat-moss litter. Feeding receptacles, preferably small galvanized pails, may be arranged on one side, a hay-rack on another side, and a long bench about 2 ft. wide and the same height from the ground on a third side. This bench serves as a sleeping as well as a milking bench. Goats prefer a hard bed, and especially one that is raised above the level of the floor. The objections to the loose box are that when the inmates are strangers to one another they are apt to fight, and when one is a bully she prevents her companions from getting their share of food. The goats will probably become friendly as they get accustomed to one another, but, if not, the troublesome animal should either be removed or fastened to a ring in the wall. An alternative plan to the loose box is to erect miniature stalls. Stalls occupy less space, but give more trouble, as they require cleaning out daily to keep them sweet; further, unless the stall is quite narrow—2½ ft. in width at the most—and the stall chain quite short and fastened to the centre in front and not at either side, the goat is likely to turn round, in which case the droppings fall into the feeding pail and get mixed with the food.

Feeding.

The goat-keeper must bear in mind three important points in feeding his stock. The first and most necessary consideration is absolute *cleanliness*, both in the food itself and in the receptacle to hold it. The best form of receptacle is a metal pail;

wooden mangers are objectionable, as the goats gnaw them and they are more difficult to keep sweet. The second point is that *variety of food* is essential; no animal tires so quickly of the same food as the goat, and it will soon give up eating if a change is not provided. The third point is one of *economy in feeding*. If a goat is fed carelessly, without due regard to its tastes or capacity, it may cost as much as its return in milk is worth; thus hay may be wasted if thrown on the ground or if placed in the manger in needlessly large quantities. In order that this fodder may not be too readily pulled out and only tit-bits consumed, it is necessary that the bars of the hay-rack should be not more than 1½ in. apart. A still more economical plan when hay is scarce and dear is to give it only in the form of chaff mixed with oats. Oats again will be wasted if mixed with the residue of the previous meal. On the whole, bran is best given by itself, either dry or, still better, as a mash. It may be added to chopped roots or potatoes, but never to corn, since to obtain the corn more readily goats will often blow away the bran. For a change middlings or sharps may be given instead of bran with chopped vegetables.

From their kid stage goats should be encouraged to eat all vegetable waste from the kitchen, or household scraps, such as broken bread, bits of toast, boiled potatoes, oatmeal porridge, &c. In the garden there is scarcely any plant which is not acceptable. The greatest care should be taken, however, to prevent goats from eating such more or less poisonous shrubs as rhododendrons, yew, and laurels. When the supply of garden produce fails, swedes or mangolds should be purchased if they can be obtained at reasonable prices. To save trouble to the attendant, and also to keep the goat occupied, these roots are best given whole, after careful washing, but they may be chopped into "fingers" as for sheep. In the former case the goat will scoop out the "flesh," leaving the outside skin as a shell. In summer, grass may be cut and supplied instead of hay. People who live in the heart of the country can take a goat along the lanes for a walk like a dog, allowing it to nibble at the roadside as it goes along.

Tethering.

Where pasturage is available goats may be tethered out during the spring and summer. It should be remembered, however,

that this system of feeding is not likely to be successful unless it is possible to provide a frequent change of ground. If only a very limited area is available, it is usually better to keep the goats on the "soiling" system throughout the year.

There are two methods of tethering: (1) By a chain, about 3 or 4 yards long, attached to an iron pin driven into the ground, and (2) by using a length of thick, galvanized wire, or, better still, as being stronger, one composed of several strands of thin wire twisted together. This wire, which may be 20 yards or more in length, should be stretched firmly along the surface of the grass and securely pegged down at each end. The goat may then be attached to the wire by means of a short chain, one end of which is fastened to its collar and the other hooked on to the wire by means of a spring hook. The hook moves backwards and forwards with the progress of the goat, which has thus the whole 20 yards as a length of run. This method of tethering allows the goat greater freedom than is the case when a single tethering pin is used. In both cases, however, it is essential that the pin be driven close down to the level of the ground, otherwise the chain is liable to get caught on, and wound round the projecting head, thus restricting the amount of liberty allowed the animal. A cord should never be used for tethering, for when it becomes wet it twists and brings about the same result. The length of the pin will depend on the kind of soil—say, 2 ft. on light soils and 18 in. on heavy land.

It is necessary to warn the goat-keeper not to attempt tethering from the middle of October to the beginning of April. Grass in winter is much reduced in nutritive value, whilst exposure to cold winds and the elements generally, without the necessary shelter or exercise to promote circulation, often causes lung trouble and diarrhœa. It is desirable, also, that the change to grass in the spring should be gradual, as the fresh herbage is almost certain to cause bad attacks of scour, which, if neglected, may have a fatal termination.

Milking and Care of Milk.

For the first three or four days after kidding the milk is specially adapted to the young kids and is not suitable for human consumption. After that time, however, the goat can be milked twice daily, or three times if the yield approaches three quarts per day.

XUM

Milking consists in sliding the first finger and thumb along the teat and squeezing out the milk. It is an operation easily learnt, but requires some practice before the requisite facility can be acquired. In regard to milking two points should be emphasized. It should be carried out at regular intervals, and the udder completely emptied each time. The more quickly the milking is performed the better, for if lingered over the goat becomes fidgety and impatient, and is very apt to place a hoof in the pail or pan, or to upset it. An impatient animal should therefore be carefully watched towards the end of milking, and any such movement prevented as far as possible. When an animal is known to be restless, it is a good plan for the milker to have an empty jug placed beside him in which to pour the milk as the process goes on. The last drops, or "strippings," are always the richest.

All utensils must be kept scrupulously clean by scalding with boiling water and exposure for a time to the air. As milk is easily contaminated, it should not be brought into contact with any strong-smelling substance. When the milk is brought from the goat-house it should be strained through a clean butter-cloth, placed over a perforated basin, into the pan intended for its reception. It should then be stored in a cool place—a dairy for preference—till required for use.

The Yield of Milk.

An average goat will give at its flush three pints a day. A goat yielding less than one quart at that stage is hardly worth keeping. This flush of milk should last for at least three months, though the later in the season the goat kids, the greater is the tendency for this period to diminish. Thus, a goat that kids in July will seldom maintain her first yield as long as one that kids in March, whilst, should kidding take place during the rutting season—that is, in October, November, and December—the maximum period will be still shorter. The goat which has been giving three pints daily from March to June may be expected to give on an average a quart for the next three months, and if during the subsequent three she gives about one pint a day, the yield may be considered satisfactory. The total milk yield will have amounted to about sixty-seven gallons. Better milkers will

give two quarts per day for the first three months, and their total yield may be set down at from eighty to ninety gallons, whilst the best goats may sometimes yield three quarts per day.

Cost of Food compared with Value of Milk.

In estimating the cost of keeping goats to provide milk for home consumption, it is understood that they are fed by a member of the family and that no land is rented especially for them. Rent and wages may, therefore, be neglected. Opinions vary as to the cost of feeding, but it may be said that, with a paddock or good-sized kitchen garden available, the cost of keep during the six months of spring and summer should not exceed 1s. a week per goat, or, say, £1 5s. altogether. During the remainder of the year, under the "soiling" system, the goat will consume on an average each day 2 lb. of hay, costing 1d., about ¼ lb. of oats and 2 oz. of bran, which may be set down as costing another 1d., or a total of about £1 10s. During the short period that garden produce is not available roots will have to be purchased, and the cost of these would bring the total for the other six months to, say, £2. This, added to the £1 5s. previously mentioned, makes £3 5s. per annum. Taking the yield to be sixty-seven gallons, and the price the low one of 5d. per quart, giving a value of £5 11s. 8d., it will be seen that even with an average goat a very fair profit is made. With a superior milker the profit would be considerably greater. The cost of litter—peat moss or straw—and other incidental charges, such as service of goat, &c., have not been included, as the value of the manure, no insignificant item, may be set against the former, and the value of kids against the latter. It should be carefully borne in mind that the above is only a rough estimate, and that the cost is not based on the prices quoted on the market to-day, but on those prevailing in normal times.—*From the Journal of the Board of Agriculture.*

ABORTION BACILLUS.

THE remarkable discovery of G. C. Schroeder and W. E. Cotton on the persistence of the abortion bacillus in the milk of cows, and particularly the demonstration of the fact that in one case it was eliminated from a cow's milk for four and a quarter years is a most interesting contribution to what was already known concerning the bacillus. As far as our preliminary investigations have gone in this direction, we find that the bacillus is present in the milk of cows in the herds we are using for our work, and this milk injected into healthy guinea-pigs does produce pathological lesions and death.

We collected in November last year a number of samples of milk from cows which were known to have aborted. Utmost regard was given to asepsis in order to eliminate all possibilities of extraneous contamination. Sterile tubes were filled by squirting the milk therein from some distance. With this milk guinea-pigs were inoculated intraperitoneally with quantities from 5 to 15 c.c.

Before injecting the milk was warmed to prevent shock. We find that guinea-pigs can accommodate large quantities of milk without any discomfort. Workers in this laboratory have used as high as 30 c.c. without untoward results.

The first guinea-pig died on the thirty-sixth day following the infection, the second on the forty-fifth day, and several between this later period and the fifty-sixth day. *Post-mortem* examinations of these pigs revealed the characteristic enlargement of the spleen. The lymphatic glands presented signs of degeneration. The liver was enlarged, with whitish spots throughout its substance. In some of our guinea-pigs the characteristic changes in the organs were not so pronounced as recorded by Schroeder and Cotton, but this may have been due to the cold quarters reducing the vitality of the small animals, so that they died before any great degenerative changes had taken place. Further, our organism may be of a greater virulence. In all our autopsies the clinical lesion in the spleen was taken as suggestive of infection, and it was from this organ that our cultures of abortion were obtained. Spleen pulp spread over the surface of the solid tube media gave excellent growths in reduced oxygen. The bacillus obtained in these cultures possessed more rapid-growing qualities than those obtained from material in the original host (the placenta and uterine contents). —*Report of Veterinary Director-General, Canada.*

Clinical Cases.

HYPERTROPHY AND DILATATION OF THE HEART.

By J. B. WOLSTENHOLME, F.R.C.V.S.

Manchester.

The patient, a heavy cart gelding, had sustained an injury to the near hock and was sent to hospital some days later with symptoms of acute lymphangitis.

May 26, 1915, pulse 96, very weak, temperature 106° F. The symptoms gradually subsided. At the beginning of June the pulse was 42, weak. On June 16, the horse was returned for light work.

On July 19 the horse returned with the same leg much swollen, but not lame. About a week later it was noticed that laboured breathing, accompanied by sweating, would come on at intervals of one or two days and would last for two or three hours.

July 29, pulse about 72, cannot count at jaw. Temperature 101° F. Very marked jugular pulse. Eating well. Lies down. Blowing. Auscultation left chest, loud rasping sound heard, loud palpitation which sounds as a bumping against the ribs. The ordinary "lub, dup" sounds are not heard. A faint, thin wheeze is heard fairly frequently.

August 3.—Eats well, bowels normal. Cannot definitely feel pulse at elbow. It is about 80. Very marked jugular pulse. Conjunctiva rather pale, blows at intervals.

August 9.—Cannot count pulse at jaw, but is just perceptible; can with difficulty make out 66 to 72 beats at elbow.

August 12.—Pulse about 80, barely perceptible at elbow. The jugular pulse is very marked on both sides of the neck.

All the veins which are visible beneath the skin are very engorged and prominent. This is especially noticeable at the jugular and spur veins. In connection with the latter, three or more tributaries very full and prominent, may be seen joining the larger vessel.

Œdema is present beneath the breast. The general condition

of the animal is very poor; thin, with wasted muscles, although the horse eats well. Has not laid down lately. Conjunctiva pallid. Heart sounds are heard distinctly over the lower right chest. Temperature normal. Cannot feel pulse at jaw or elbow.

Auscultation left chest, over heart area a loud, irregular sound is heard, as of the heart bumping against the ribs. It is also felt by the ear and face whilst listening. The noise varies in intensity and speed, at times loud, and then low. The bumping sound is accompanied by a to-and-fro rasping sound.

The œdema beneath sternum is increased, is now the size of a small pillow. The left spur vein is very large and engorged. Four tributaries can be seen flowing into it. The right spur vein, though enlarged, does not seem quite so big as the left. The superficial veins on the inner aspect of the thighs are engorged. Conjunctiva rather pale. Eats well, has laid down once or twice.

On taking the pulse from the posterior aorta it is 72 to 80, very irregular.

August 16.—Horse killed by "Greener," and not bled.

Post mortem.—Lungs, heart, and abdominal viscera, *i.e.*, stomach and bowels, pallid. When removing the muscles of the back they seemed to be extra dark and engorged with blood. The subcutaneous tissue in places is œdematous. About a pint of straw-coloured serum in the pericardial sac. Heart an enormous size, greatest width when collapsed 15½ in. It is 16 in. in length from the summit of the auricles to the point of the left ventricle.

When emptied of clots, both the auricles and ventricles were collapsed and pale in colour. After being ten days in a solution of formaldehyde, and the removal of all extraneous material, the heart weighed 16 lb.

A large amount of straw-coloured, semi-transparent, gelatinous serum, which could be pulled off by the fingers, was around the root of the aorta, and the large vessels at the base of the heart. In a similar manner a small quantity of the jelly-like substance accompanied the coronary vessels.

The above case, as regards pulse, jugular pulse, and cardiac sounds, is very similar to one of some five years ago, which I kept under observation in hospital for 123 days, and finally it died from twist of the large colon and rupture of the stomach.

The heart weighed 20 lb., and an important difference was manifested: that for weeks the temperature was high, extending from 102° to 106° F.

[The normal weight of a horse's heart is about 1 per cent. of the body-weight.]

PURPURA HÆMORRHAGICA.

By J. B. WOLSTENHOLME, F.R.C.V.S.

Manchester.

In the experience of the writer of these notes, purpura hæmorrhagica is rarely seen as a sequel to suppurating wounds in the horse, although I am informed that such does occur in the human subject.

A six-year-old Shire gelding received a severe wound by a tread over the pyramidal process of the off hind foot. The resulting suppuration was considerable and unhealthy, the pain was severe.

Treatment adopted was antiseptic fomentations and hot boric wool poultices. The progress and condition of the wound continued to be unsatisfactory. At the end of three weeks' time purpura developed. The pulse became exceedingly weak and quick, accompanied by the characteristic swelling of all four legs, also of the face, breast, and beneath the abdomen. Purpuric spots were present on the conjunctival membranes, and large red areas appeared beneath the Schneiderian membranes, the latter was accompanied by a sanious discharge from both nostrils.

TEMPERATURE.

First day	...	101·6°	Fifth day	...	105·0°
Second ,,	...	102·2°	Sixth ,,	...	103·6°
Third ,,	...	101·0°	Seventh ,,	...	102·0°
Fourth ,,	...	102·2°	Eighth ,,	...	normal

As might be inferred, there was an exacerbation of the symptoms on the fifth day, and the horse became very feeble.

On the seventh day there were symptoms of abdominal pain. On the eighth and ninth days the horse was so weak that he had to be raised with blocks and slings, after which he was kept in the slings, loosely applied, until he left hospital three weeks later in fair health and fairly lively.

HÆMORRHAGE FROM THE BOWEL IN THE DOG.

By G. MAYALL, M.R.C.V.S.

A FOX terrier was brought into the infirmary in March with the history that he was passing teaspoonfuls of blood in his motions. He was kept under observation and the statement was verified. The dog seemed slightly depressed, membranes pale, temperature and pulse not much disturbed. The blood passed was of a venous character.

I considered what was to be done and was rather puzzled as to what therapy to apply. Exploration per rectum gave no indication as to anything wrong with this organ as far as it could be felt. It seemed evident that the bleeding was from a vessel beyond reach and not to be remedied by local applications directly applied. The thought then struck me that I had some "tabloids" of lodal by me that had been successfully used on the recommendation of a veterinary surgeon for uterine hæmorrhage in a bitch some time previously. I resolved to try them on this case. "Tabloids" of 1 gr. of lodal (Burroughs Wellcome) were given night and morning, and although the blood was present for a week in varying but lessened quantities, and there was some diarrhœa, yet gradually recovery took place with the medicine indicated and a diet of arrowroot biscuits and milk in small quantities. "Lodal" is an oxidation product of laudanosine, which is an alkaloid obtained from opium. It causes a rise in blood-pressure due to slight vaso-constriction and increased cardiac output. It is particularly and almost solely recommended to allay uterine hæmorrhage. In this case it did good in a bowel case, but it must be recollected that here the patient was a dog and not a bitch. The dose given was the human one.

The cause and origin of the hæmorrhage were obscure, but nothing was passed in the motions to indicate that it was due to a foreign body and nothing could be detected externally by palpation.

VAGINITIS, URETHRITIS AND RETENTION OF URINE IN THE COW.

By G. MAYALL, M.R.C.V.S.

Called in February to a recently bought cross-bred, red and white horned cow that had picked her calf at about the seventh month of pregnancy. Was told that she was constantly straining, only passed urine in driblets, and had not had a free stream for several days. On examining the vagina found it spotted and inflamed, the tumefied and corded urethra could be felt through the floor of the vagina, and the bladder was greatly distended. There was no vaginal discharge. Passed the catheter, when about 2 quarts of bad-smelling, high-coloured urine was voided, the cow straining intermittently all the time. There was no pus, flocculi, or sediment in the urine. The dung was lumpy and passed in jerks during the catheterization. Injected the vagina well for five minutes with mercuric iodide solution 1 in 5,000. Afterwards inserted one of Burroughs Wellcome and Co.'s corrosive sublimate bougies gr. 1/25. Left a bottle of medicine containing liquor hamamelidis 2 oz., pot. bicarb. 2 oz., sodæ hyposulph. 1 oz., water to 12 oz. To be well shaken and a fourth part given night and morning in a pint of linseed tea.

Next day cow much better, no straining, vagina a more healthy colour. Syringed again with mercuric iodide solution and inserted another pessary or bougie. Left two pessaries to be inserted by the owner. This cow went on wonderfully well and needed no further attention.

The Burroughs Wellcome bougies are the handiest I have yet used. They are smaller than those usually made, not being much thicker in calibre than an ordinary lead pencil, consequently they are suitable for any of our patients. They melt quickly and are apparently quite effective. They are handy to insert. Mercuric iodide solutions (made from tabloids so that the strength can be regulated) I have found to be far and away the most reliable injections in vaginal and uterine affections in all animals. In cases of metritis and vaginitis in the mare and cow I have found them exceedingly valuable.

Laboratory Notes.

A CASE OF CONTAGIOUS BRONCHO-PNEUMONIA CAUSED BY *BACILLUS COLI COMMUNIS*.[1]

By EDWIN M. STANTON.
Detroit, Mich.

Hutyra and Marek [2] state that enzootic pneumonia of young animals is caused by the *Bacillus bipolaris septicus* or its varieties. However, cases are on record where the disease has been due to an infection with the *Bacillus pyogenes*, the *Streptococcus pyogenes*, and by the bacteria of the colon group. It is further stated that in other enzootic diseases, as white scour and dysentery of sucklings, contagious broncho-pneumonia occurs as a secondary infection. E. Wallis Hoare [3] says that broncho-pneumonia is caused by a variety of organisms; the bipolaris being the most common. He states that the *Bacillus coli communis* produces broncho-pneumonia as a secondary infection of white scour, and in the chapter upon white scour [4] it is stated the lung affection follows as a complication.

The statements of these two authors are exceedingly interesting. They show that it is possible for animals affected with a contagious intestinal disease to infect other animals with the organisms causing that intestinal disease, and that the latter animals may manifest entirely different symptom complex than that which existed in the animals primarily infected. The disease produced in the secondarily infected animals may involve a different anatomical system. In this way a secondary disease of a highly contagious nature is introduced into a herd. In other words, we have an organism such as *Bacterium coli communis*, that is capable of producing in the animal economy two highly contagious diseases of a different nature.

During November of 1913 a section of lung was sent to this laboratory by the late Doctor Frederick H. Osgood, of Boston, Mass., with the request that a diagnosis be made. The history accompanying the specimen stated that the specimen was from a six months old calf, which had died, exhibiting symptoms before death of a disease which had affected forty other calves upon the premises, resulting in the death of these animals.

The symptoms as stated were as follows: Elevation of temperature, discharge from the mucous membranes of the eyes and nostrils, loss of appetite, emaciation and respiratory disturbances, and death. It was stated that the disease occurred after the introduction into the herd of some thoroughbred Jerseys.

Gross Pathology.—The surface of the lung tissue was greenish in colour, roughened and covered with round and oval nodules about the size of a small pea. The nodules were soft, and when pressed a thick, creamy pus exuded. Upon cutting into the tissue the cut surface was of a dark red colour. From the section of tissue pus exuded. The tissue was heavier than water and non-crepitant.

Bacteriological Examination.—Smears from the pus were made, and when stained revealed a few streptococci and numerous short bacilli.

Agar plates were made from the pus in the usual way. One set was incubated aerobically, the other anaerobically. After twenty-four hours' incubation both series of plates contained many colonies of bacilli. No colonies of streptococci nor staphylococci were observed on either set of plates.

Subcultures were made upon plain agar slants and incubated eighteen hours. Microscopical examination showed that the cultures consisted of a short bacillus. The organism was then transferred to differential media consisting of agar slant, plain agar deep, glucose agar deep, plain bouillon, plain and litmus milk, gelatine, potato and fermentation tubes of glucose, lactose and saccharose.

Description of Organism.

Morphological Characteristics.—A short, plump motile rod, which is Gram negative, and does not form spores.

Cultural Characteristics.—Plain agar, a translucent, raised, moist growth with wavy margins.

Deep Agar.—Translucent, confluent colonies along line of stab, and on the surface above the entrance of stab the growth raised and slightly greyish. A few gas bubbles observed in the body of the medium.

Glucose Agar Deep.—The growth the same as in agar deep. Medium, broken by gas formation.

Plain Bouillon.—Cloudy, viscid sediment formed at the bottom. A fæcal odour was noticeable.

Plain Milk.—Coagulated, not digested. *Litmus Milk.*—Acid, coagulated. *Gelatine.*—Not liquified. Confluent colonies along line of puncture.

Potato.—Greyish white, glistening growth. *Glucose Bouillon.*—5 c.c. of gas, acid. *Lactose Bouillon.*—1 c.c. of gas, acid. *Saccharose Bouillon.*—3 c.c. of gas, faintly acid. *Durham's Peptone Solution.*—Indol formed.

From the cultural and morphological characters, the organism was identified as *Bacillus coli communis.*

From the pathological condition of the section of lung sent in, it was evident that a pneumonic condition existed. The symptoms stated pointed to a broncho-pneumonia, and from the bacteriological findings it appeared that the *B. coli communis* was the causative agent.

References.

[1] Research Laboratory, Parke, Davis and Co., from collected papers.
[2] Hutyra and Marek: "Pathology and Therapeutics of the Diseases of Domestic Animals," vol. ii, pp. 134-135.
[3] E. Wallis Hoare: "A System of Veterinary Medicine," vol. i, p. 496.
[4] *Ibid.*, p. 504

XUM

SCURVY AMONGST YOUNG PIGS.

By J. B. CLELAND, M.D., Ch. M.

In September, 1911, some young pigs died unexpectedly at the Experiment Station on Milson Island. Three of them died on one day, and one on the next, and two others became acutely ill. The two sick pigs showed a great disinclination to move in any way. Their hair was rough and unkempt. One of them showed considerable swelling of the right hind and left fore-feet, the swelling being most marked over the metacarpal and metatarsal regions. The animal seemed to suffer a good deal of pain. It was killed, and a *post-mortem* examination held to ascertain the nature of the condition.

The lung showed a few small petechial patches under the serous coat; there was no pneumonic consolidation. There were one or two narrow darker areas, probably the result of previous consolidation or collapse. The heart, liver, and spleen appeared to be normal. The peritoneal cavity showed no excess of fluid. The small intestines for a great part of their extent were congested; and the solitary follicles of the large intestine were prominent, but there was no ulceration. The mesenteric glands showed slight areas of blood extravasation towards their periphery. There was slight extravasation of blood in the right groin, and the inguinal glands of the right side were a little enlarged.

The swollen area of the right hind leg proved to be a hæmorrhagic exudation under the periosteum of the metatarsal bones and into the medulla. The periosteum stripped easily, leaving the bone bare.

In the case of the left foreleg a very similar condition was present, save that the medulla was more affected than the periosteum.

The appearances presented suggested the possibility of scurvy, and a consideration of the food the animals had been receiving seemed to indicate a lack of fresh food. This diagnosis was supported by the fact that cultures from the lesions were sterile, and inoculations into other pigs with material failed to give any result. An alteration in diet, so as to give the animals more fresh food, quickly resulted in the cure of the remaining pig, and in the prevention of any fresh cases.—*Report Government Bureau Microbiology, New South Wales.*

Abstract.

AVIAN TUBERCULOSIS.

By C. H. HIGGINS and A. B. WICKWARE.

Biological Laboratory.

The disease known under the synonyms, consumption, tuberculosis, and the great white plague (the latter applying more specifically to the affection as found in human beings) is of such widespread importance as to warrant careful consideration, whether appearing in men or animals.

In preparing an article dealing exclusively with this malady as observed in fowls and birds in general, no presumption is made of bringing to light new disclosures, but rather an endeavour will be made to deal with the affection in a general way, from a pathological as well as economic standpoint, and also to record such of our experiments as have a practical bearing on the prevention and eradication of this disease.

It is only within comparatively recent times, slightly over a decade, that tuberculosis as a disease has been observed among fowls in Canada. The affection had probably existed for many years, but its true nature and significance was not recognized until diseases of poultry commenced to attract the attention of workers in comparative pathology. Even up to the present time, the importance of the conservation of domestic fowls is scarcely realized, and apart from the purely technical considerations of the diseases which they may contract, very little thought has been exercised as to how the fostering of the industry will affect our domestic economy.

The losses from tuberculosis have been large to poultry owners, but there is at present no means of arriving, even approximately, at an accurate estimate. Theoretically, poultry offer one of the best investments for capital, but the losses are so great that the theoretical estimate must be discarded. Once tuberculosis disease makes its appearance in a flock, the aggregate losses are large, although a great number of birds do not usually die at one time. The general unthriftiness of the fowls, however, renders them unsuitable for table use, and the non-production of eggs makes the industry very unprofitable as well as discouraging to the poultry owner.

As avian or fowl tuberculosis, viewed from a causative standpoint, is almost identical with the disease as found in human beings and bovines, it is imperative that further research work be conducted in order to establish, if possible, its exact relation as a source of infection for other animals and man.

The matter is more pertinent since Mohler and Washburn, of the United States Bureau of Animal Industry, have reported the transmission of avian tuberculosis to mammals by the direct feeding of diseased organs, and also the infection of guinea-pigs by artificial inoculation with the whites of eggs from affected fowls.

That there is considerable variation in the morphology of the causative organisms found in the different forms of tuberculosis cannot be disputed, but extensive investigations have shown that even these apparently specific characteristics can be altered by artificial cultivation upon various laboratory media and also by growth in the tissues of different animals.

The fact that avian tuberculosis is transmissible to mammals, and the mammalian type communicable to human beings, serves to substantiate the theory that changes may occur in the human host whereby the avian and bovine types of organism may undergo transformation into the human type.

Recent statistics show that the bovine type of organism was present in 90 per cent. of cases of cervical adenitis (enlarged glands of the neck) occurring in children in the vicinity of Edinburgh, infection probably arising through the consumption of non-pasteurized milk. As these and many other cases of human tuberculosis have been traced to infection through the medium of raw milk, it is only natural that one should question the possibility of transmission of this insidious disease through the medium of raw eggs. This assumption does not seem unreasonable in view of the fact that raw eggs form the principal article of diet for invalids and individuals whose natural resistance may be lowered, and whose systems are impoverished from any one of a number of causes.

Himmelberger, of the Michigan Agricultural College, has recently succeeded in transmitting avian tuberculosis to a bovine, in which latter he obtained a reaction with avian tuberculin, although unable to elicit a response when using the bovine tuberculin.

During investigations conducted at this laboratory throughout

the past two years, our attention has been chiefly directed towards the microscopic detection of tubercle bacilli in eggs, the infection of experimental animals with these eggs, and the perfecting of a method of diagnosis whereby latent and incipient cases could be identified.

The possibility of congenital tuberculosis being present in chicks has been given considerable attention, but our experiments in this connection have thus far given only negative results. Eggs from tuberculous fowls have been artificially incubated and the chicks immediately transferred to new quarters, where special precautions were taken to prevent infection from outside sources. The most careful autopsies, however, failed to reveal lesions of tuberculosis, while cultures from splenic tissues gave negative results.

The demonstration of acid-fast* organisms in eggs was also undertaken, and in nearly 20 per cent. of the latter, bacilli microscopically indistinguishable from tubercle were found to be present. The subsequent inoculation of guinea-pigs with material from these eggs produced a generalized tuberculous infection, from which typical avian cultures were procured.

Symptoms of the Disease.

The causative organism or germ of tuberculosis gains entrance to the system, usually with the food, and finding a favourable location grows and extends to the various tissues. This growth of the germ induces symptoms of unthriftiness, and this unthriftiness is followed sooner or later by death. The detection of tuberculosis from the symptoms is not always easy. Some may be observed to be "going light," yet they are seen to be good feeders. If picked up it is found that the flesh has almost entirely disappeared from the breast-bone, and this should make one suspicious that something is wrong. A yellow or greenish diarrhœa is frequently present in affected birds, and, where this is present the type of the disease is most dangerous to the remainder of the flock, as the germs are to be found in the droppings in immense numbers.

One of the most frequent symptoms seen early in the course

* Tubercle bacilli from any source possess the peculiarity of retaining the dye material used for their study in the presence of acid, hence the term acid-fast.

of the disease is lameness, a result of the infection involving a joint of the leg. Lameness is mentioned by persons forwarding fowls for diagnosis more frequently than any other symptom where our subsequent examinations have proven the trouble to be due to tuberculosis. So frequently is lameness the principal symptom observed that we are at once suspicious of tuberculosis whenever the symptom is mentioned.

Course of the Disease.

Fowl affected with tuberculosis may die in a few days from the first appearance of symptoms, or they may linger for weeks, gradually becoming more emaciated as the disease progresses, until they die from exhaustion. The progress is largely dependent on the strength of the invading germ and the natural resistance of the bird. Some outbreaks of the disease follow a more rapid course than others; usually, however, the course in an individual extends over weeks, and sometimes months may intervene before death takes place.

Post-mortem Findings.

The *post-mortem* findings in fowl tuberculosis, when considered in relation to the symptoms and general history, are characteristic. The liver is usually the principal organ affected, and there are lesions from the size of a pin point to that of a large pea, which are white or yellow in colour. The larger lesions when cut into give a gritty sensation as the knife passes through them. These lesions are distinct from the liver tissues, and may be quite easily separated from the liver itself. In the more acute cases the liver may be greatly enlarged, even to twice its normal size. This enlargement in chronic cases is noticeable. The spleen is usually involved, the lesions having the same characters as mentioned for those in the liver. The enlargement of the spleen is usual, and it may be four times its normal size. The intestines may or may not be involved. When lesions are present we find nodules from the size of a small pea to that of a medium-sized nut. The minute dissection of these usually presents a free opening into the inside of the bowel, and at this point of entrance there is an ulceration. It is through this opening from the nodule on the intestine to the interior of the bowel that the bacilli gain access to and are so easily distributed by the droppings.

Other visceral organs are seldom involved. It is frequently observed that the joints, notably that of either or both hips, may be the seat of tubercular ulcerations. Such an ulceration is the cause of lameness during life.

PREVENTION AND TREATMENT.

In the prevention of tuberculosis and other infectious diseases of fowl, sanitary surroundings, with plenty of sunlight and fresh air are requisites of prime importance. In our opinion these features are best obtained by the use of the modern cotton-front house, a number of types having been described by various poultry authorities. Circular No. 7, prepared by the late Professor A. G. Gilbert, of the Experimental Farm Staff, describes in detail the method of construction and may be obtained on application.

The best means of preventing and treating tuberculosis in fowls is to destroy the entire flock if all have been running together, and to thoroughly cleanse and disinfect the quarters which they have occupied with any good disinfectant, one of which is a 5 per cent. solution of crude carbolic acid. This may be made by adding two teacupfuls of crude carbolic acid to a pail of hot lime wash. This should be applied with a spray pump, brush, or old broom to all parts of the house occupied by the fowl. This method of disinfection is suggested, owing to the fact that in tuberculosis or consumption in fowls, as has already been indicated, the bacilli or germs are found in the droppings in great numbers, and these should be destroyed. This action is further recommended, as it has been shown that fowls, dead of tuberculosis, if eaten by hogs, communicate the disease to them, and it is probable that the droppings would also communicate the disease in a similar manner.

When destroying the birds after it has been demonstrated that tuberculosis is present, some may be suitable for food if an examination of the livers shows no yellow or white spots from the size of a pin point to that of a pea, and there are no nodules or lumps on the intestines. When these lesions are present the flesh cannot be considered suitable for human food.

We have found that eggs from tuberculous fowls may contain the bacilli or germs in the white, and we, as well as others, have demonstrated that they are in sufficient numbers to infect small experimental animals.

This suggests a possible source through which tuberculosis may be introduced into a flock, namely, by the unsuspecting purchase of eggs from someone who has tuberculosis among his fowl.

The drastic measures above recommended should be followed in all cases when tuberculosis appears among fowl. These measures, while temporarily entailing a considerable loss, will in the end prove the most economical to the owner and the community.—*From Report of Veterinary Director-General, Canada.*

ARMY VETERINARY SERVICE.

Regular Forces. Army Veterinary Corps.

Temporary Lieutenant H. G. Bowes to be temporary Captain whilst holding a special appointment.

Temporary Lieutenants to be temporary Captains: L. Littler, W. S. Thompson, S. E. Robson, R. N. M. Williams, R. J. Hall, G. W. Roberts, T. C. Howatson.

To be temporary Lieutenant: P. S. Howard, F.R.C.V.S.

Temporary Lieutenant C. W. Baker relinquishes commission on termination of his engagement.

To be temporary Lieutenants: A. E. Willett, K. Barker, F. D. Neal.

Captains to be temporary Majors whilst holding appointment of Assistant Director of Veterinary Services of a Division: T. Bone, R. Tindle.

Temporary Lieutenants to be temporary Captains: B. M. R. West, F. M. Coombs, A. E. Roberts, A. V. Meeke, P. Braid, W. Barr, K. A. Roberts, W. S. Stevens.

The Christian names of Temporary Lieutenant Frederick Lawrence Clunes are as now described, and not as in *Gazette* of March 25, 1915.

Major W. B. Edwards to be Temporary Lieutenant-Colonel whilst holding the appointment of Assistant Director of Veterinary Services, Cavalry Corps.

Temporary Lieutenants to be temporary Captains: G. S. Thornewill, R. W. MacDonald, A. R. Younie, J. Buie, G. P. Hayter, A. E. Bailey.

To be temporary Lieutenant: R. S. Pethick.

Temporary Lieutenant to be temporary Captain: W. H. Blanchard.

Temporary Lieutenant T. V. Simpson relinquishes his commission on termination of engagement.

To be temporary Lieutenant: B. McMahon.

The dates of promotion of the following Lieutenants to be Captains are as now stated, and not as in *Gazette* of February 1: P. S. Sparling (September 19), R. Chown (September 22).

To be temporary Lieutenant: J. Lawther.

Temporary Lieutenant to be temporary Captain: T. B. Bindloss.

To be temporary Lieutenant: S. E. Boulter.

Temporary Lieutenant R. Colthurst relinquishes his commission.

To be temporary Lieutenants: S. L. Wall, H. V. Fenn.

Temporary Lieutenants to be temporary Captains: H. A. Trudel, H. Chagnon, J. W. Bennett, W. B. Howe.

To be temporary Lieutenant: G. Currey.

Captains to be temporary Majors whilst holding appointment of Assistant Director of Veterinary Services of a Division: R. W. Mellard, H. C. Stewart.

Captains to be temporary Majors: G. W. Godwin, whilst commanding a Veterinary Hospital; W. I. Macaulay, whilst Assistant Director of Veterinary Services of a Division.

Temporary Lieutenant to be temporary Captain: F. L. Clunes.

Temporary Lieutenant H. Walpole relinquishes his commission on termination of his engagement.

To be temporary Lieutenant: J. R. Rigby.

Temporary Lieutenant to be temporary Captain: H. W. Percy.

TERRITORIAL FORCE. ARMY VETERINARY CORPS.

Captain to be temporary Major: P. J. Simpson.

Lieutenant E. Child relinquishes commission on account of ill-health.

Lieutenants to be Captains: D. Weir, Temporary Captain R. E. Beilby, D. R. Chatterley, and to remain seconded, Temporary Captain M. T. Sadler, J. H. Thompson, J. Blakeway, A. G. Saunders, Temporary Captain J. C. S. Powell, R. M. Aulton, L. W. Wynn Lloyd, Temporary Captain C. R. Chadwick, A. C. Duncan, F.R.C.V.S., W. S. Lornie, A. F. Castle, F.R.C.V.S., P. R. O. Thrale, E. S. Martin, J. G. McGregor, F. E. Heath, W. D. Jordan, J. H. Wright, F. W. C. Drinkwater, W. D. Williams, Temporary Captain P. S. Morgan, C. W. Cartwright, T. Thomson, R. W. Williams, J. H. Jones, R. H. H. Over, E. Berry, V. P. Jones, G. E. Henson, J. Y. Bogue, V. A. Bartrum, R. B. Palmer, J. R. McCall, D. R. Crabb, T. Bagshaw, Temporary Captain A. J. Hines, T. A. B. Cocksedge, F. J. Moon, A. Robb (jun.), W. G. Thomson, Temporary Captain A. R. Routledge, J. A. Shaw, G. W. Bloxsome, H. H. Lord, F. B. Ditmas, J. Facer, W. Aitkin, P. S. Thierry, A. H. Adams, J. R. Crane, J. Sheffield, Temporary Captain F. Hopkin, H. C. Taylor, D. H. Rylands, J. A. G. Gosling, J. Southall, C. Taylor, L. A. F. Dawson, H. Sumner, H. McD. Paul, W. T. Olver, A. J. Beckett, J. C. Gaunt, J. Cameron, R. J. Sargent, C. W. Townsend, R. L. Armour, H. Newton, B. J. Rees, A. Mackenzie, B. H. Benson, F. B. Greer, G. G. Sooby, G. M. Vincent, W. F. Wilson, R. Bryden, A. S. Chisholm, R. C. Matthews, A. H. Watson, J. Cunningham, C. Holland, W. H. Townson, E. E. C. Maclachlan, J. W. H. D. Sarjeant, J. Donaldson, J. F. Player, T. S. Green, W. F. Garside, H. D. Sparrow, J. F. Taylor, A. H. Leyland, J. C. Storie, W. L. Sheffield, F. Bradley, J. G. Deans, J. M. McMaster, R. W. Clarke, J. A. Craft, W. H. Brown, R. Simpson, T. Craig, E. J. Laine, J. R. Green, S. G. Howard, Temporary Captain J. Bell, G. O. Ogden, E. R. H. Woodcock, F. J. Richmond, G. C. Robertson, V. S. M. Cope, W. P. S. Edwards, H. A. Thorne, W. G. Darling, J. Daly, D. Keir, G. Atkinson, R. A. Edwards, J. Spruell, J. Martin, C. E. Y. Bryan, J. P. Heath, E. F. Angler, A. C. Burton.

Captain D. R. C. Tennant to be Assistant Director of Veterinary Services and granted temporary rank of Major whilst so employed.

TERRITORIAL FORCE. ARMY VETERINARY CORPS.

The dates of promotion of the following Captains are as stated against their names, and not as announced in *Gazette* of February 26: G. W. Bloxsome (August 5); H. H. Lord (August 6); F. B. Ditmas (August 7); J. Facer, W. Aitkin (August 8); P. S. Thierry

(August 9); A. H. Adams, J. R. Crane (August 19); J. Sheffield, F. Hopkin, H. C. Taylor (August 20); D. H. Rylands, J. A. G. Gosling, J. Southall (August 22); C. Taylor (August 25); L. A. F. Dawson (August 26); H. Sumner, H. McD. Paul (August 29); W. T. Olver (August 30); A. J. Beckett (August 31); J. C. Gaunt (September 1); J. Cameron (September 3); R. J. Sargent, C. W. Townsend, R. L. Armour, H. Newton, B. J. Rees, A. Mackenzie (September 5); B. H. Benson (September 6); F. B. Greer (September 9); G. G. Sooby, G. M. Vincent, W. F. Wilson (September 12); R. Bryden (September 14); A. S. Chisholm, R. C. Matthews (September 19); A. H. Watson (September 22); J. Cunningham, C. Holland (September 23); W. K. Townson (September 25); E. E. C. Maclachlan, J. W. H. D. Sarjeant (September 30); J. Donaldson, J. F. Player (October 1); T. S. Green (October 2); W. F. Garside (October 3); H. D. Sparrow (October 5); J. F. Taylor (October 7); A. H. Leyland, J. C. Storie, W. L. Sheffield (October 10); F. Bradley (October 17); J. G. Deans (October 18); J. M. McMaster (October 24); R. W. Clarke (October 27); J. A. Craft (October 29); W. H. Brown (November 1); R. Simpson, T. Craig (November 6); E. J. Laine (November 12); J. R. Green (November 15); S. G. Howard (November 19); J. Bell (November 21); G. O. Ogden (November 27); E. R. H. Woodcock (November 28); F. J. Richmond (November 30); G. C. Robertson, V. S. M. Cope (December 23); W. P. S. Edwards (January 1); H. A. Thorne (January 2); W. G. Darling (January 5); J. Daly (January 13); D. Keir, G. Atkinson (January 20); R. A. Edwards (January 22); J. Spruell (February 2); J. Martin (February 10); C. E. W. Bryan (February 11); J. P. Heath, E. F. Angler (February 13); A. C. Burton (February 27).

Lieutenant W. Wordley is removed from the Territorial Force for absence without leave.

Captain D. Hamilton relinquishes his commission on account of ill-health; Captain J. C. Coleman resigns commission.

Captain A. Spreull to be Assistant Director of Veterinary Services, and granted temporary rank of Major whilst holding the appointment.

The President of the French Republic has bestowed the "Medaille Militaire" on the following, in recognition of distinguished service during the campaign:—

Staff-Sergeant (temporary Sergeant-Major) A. J. Warburton, 72.

Captain S. J. Williams to be Assistant Director of Veterinary Services, and granted temporary rank of Major whilst so employed.

Captain J. E. L. Still to be Assistant Director of Veterinary Services, and granted temporary rank of Major whilst so employed.

SPECIAL RESERVE OF OFFICERS.

Lieutenants (on probation) confirmed in rank: C. P. Fisher, G. Lloyd, C. R. Roche, F. J. Shearman, E. J. Mulligan, R. H. Stalker.